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Betzner, Andreas
Freyssinet, Georges
Perez, Pascal

<120> METHOD FOR OBTAINING PLANT VARIETIES

<130> A33153-PCT-USA 072667.0128

<140> US 09/529,239

<141> 2000-10-27

<150> PCT/EP98/06977

<151> 1998-10-09

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<223> MSH3 specific primer S525 for PCR using cDNA of Arabidopsis thaliana ecotype Columbia

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<212> DNA

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<223> MSH3 specific primer S525 for PCR using cDNA of Arabidopsis thaliana ecotype Columbia

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catttctctt aaacggagga gattacgaat aaagcaatt                               99

atg ggc aag caa aag cag cag acg att tct cgt ttc ttc gct ccc aaa      147
Met Gly Lys Gln Lys Gln Gln Thr Ile Ser Arg Phe Phe Ala Pro Lys
  1             5             10             15

ccc aaa tcc ccg act cac gaa ccg aat ccg gta gcc gaa tca tca aca      195
Pro Lys Ser Pro Thr His Glu Pro Asn Pro Val Ala Glu Ser Ser Thr
             20             25             30

ccg cca ccg aag ata tcc gcc act gta tcc ttc tct cct tcc aag cgt      243
Pro Pro Pro Lys Ile Ser Ala Thr Val Ser Phe Ser Pro Ser Lys Arg
             35             40             45

aag ctt ctc tcc gac cac ctc gcc gcc gcg tca ccc aaa aag cct aaa      291
Lys Leu Leu Ser Asp His Leu Ala Ala Ala Ser Pro Lys Lys Pro Lys
             50             55             60

ctt tct cct cac act caa aac cca gta ccc gat ccc aat tta cac caa      339
Leu Ser Pro His Thr Gln Asn Pro Val Pro Asp Pro Asn Leu His Gln
             65             70             75             80

aga ttt ctc cag aga ttt ctg gaa ccc tcg ccg gag gaa tat gtt ccc      387
Arg Phe Leu Gln Arg Phe Leu Glu Pro Ser Pro Glu Glu Tyr Val Pro
             85             90             95

gaa acg tca tca tcg agg aaa tac aca cca ttg gaa cag caa gtg gtg      435
Glu Thr Ser Ser Ser Arg Lys Tyr Thr Pro Leu Glu Gln Gln Val Val
             100            105            110

gag cta aag agc aag tac cca gat gtg gtt ttg atg gtg gaa gtt ggt      483
Glu Leu Lys Ser Lys Tyr Pro Asp Val Val Leu Met Val Glu Val Gly
             115            120            125

tac agg tac aga ttc ttc gga gaa gac gcg gag atc gca gca cgc gtg      531
Tyr Arg Tyr Arg Phe Phe Gly Glu Asp Ala Glu Ile Ala Ala Arg Val
             130            135            140

ttg ggt att tac gct cat atg gat cac aat ttc atg acg gcg agt gtg      579
Leu Gly Ile Tyr Ala His Met Asp His Asn Phe Met Thr Ala Ser Val
             145            150            155            160

cca aca ttt cga ttg aat ttc cat gtg aga aga ctg gtg aat gca gga      627

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cct	ctt	tca	caa	caa	act	gag	aag	ttt	ttg	gtg	gca	cat	gct	gga	cct	1059	
Pro	Leu	Ser	Gln	Gln	Thr	Glu	Lys	Phe	Leu	Val	Ala	Met	Ala	Gly	Pro		
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Gly	Met	Ser	Cys	Leu	Thr	Val	His	Thr	Ile	Met	Asn	Met	Pro	His	Leu		
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Asn Thr Glu Met Thr Leu Ser Ala Asn Thr Leu Gln Gln Leu Glu Val				
420	425	430		
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Val Lys Asn Asn Ser Asp Gly Ser Glu Ser Gly Ser Leu Phe His Asn				
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Met Asn His Thr Leu Thr Val Tyr Gly Ser Arg Leu Leu Arg His Trp				
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Val Thr His Pro Leu Cys Asp Arg Asn Leu Ile Ser Ala Arg Leu Asp				
465	470	475	480	
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Ala Val Ser Glu Ile Ser Ala Cys Met Gly Ser His Ser Ser Ser Gln				
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Pro Glu Phe Tyr Leu Val Leu Ser Ser Val Leu Thr Ala Met Ser Arg				
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aaa gcc aca gag ttc att gca gtt atg gaa gct att tta ctt gcg ggg	1779			
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580	585	590		
gtt att tca tcc cct gtt gtg gtt gac aat gcc gga aaa ctt ctc tct	1923			
Val Ile Ser Ser Pro Val Val Val Asp Asn Ala Gly Lys Leu Leu Ser				
595	600	605		
gcc cta aat aag gaa gcg gct gtt cga ggt gac ttg ctc gac ata cta	1971			
Ala Leu Asn Lys Glu Ala Ala Val Arg Gly Asp Leu Leu Asp Ile Leu				
610	615	620		

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Ile Thr Ser Ser Asp Gln Phe Pro Glu Leu Ala Glu Ala Arg Gln Ala	
625 630 635 640	
gtt tta gtc atc agg gaa aag ctg gat tcc tcg ata gct tca ttt cgc	2067
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645 650 655	
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660 665 670	
aca cat ttg ata gag ctg ccc gtt gat tcc aag gtc cct atg aat tgg	2163
Thr His Leu Ile Glu Leu Pro Val Asp Ser Lys Val Pro His Asn Trp	
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690 695 700	
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Cys Leu His Ser Leu Ser Thr Leu Ser Arg Asn Lys Asn Tyr Val Arg	
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Pro Glu Phe Val Asp Asp Cys Glu Pro Val Glu Ile Asn Ile Gln Ser	
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Ile Ser Ile Met Ala Gln Val Gly Ser Phe Val Pro Ala Ser Phe Ala	
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Lys Leu His Val Leu Asp Gly Val Phe Thr Arg Met Gly Ala Ser Asp	
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Ser Ile Gln His Gly Arg Ser Thr Phe Leu Glu Glu Leu Ser Glu Ala	
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Ser His Ile Ile Arg Thr Cys Ser Ser Arg Ser Leu Val Ile Leu Asp	
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gag ctt gga aga ggc act agc aca cac gac ggt gta gcc att gcc tat	2835
Glu Leu Gly Arg Gly Thr Ser Thr His Asp Gly Val Ala Ile Ala Tyr	
900 905 910	
gca aca tta cag cat ctc cta gca gaa aag aga tgt ttg gtt ctt ttt	2883
Ala Thr Leu Gln His Leu Leu Ala Glu Lys Arg Cys Leu Val Leu Phe	
915 920 925	
gtc acg cat tac cct gaa ata gct gag atc agt aac gga ttc cca ggt	2931
Val Thr His Tyr Pro Glu Ile Ala Glu Ile Ser Asn Gly Phe Pro Gly	
930 935 940	
tct gtt ggg aca tac cat gtc tcg tat ctg aca ttg cag aag gat aaa	2979
Ser Val Gly Thr Tyr His Val Ser Tyr Leu Thr Leu Gln Lys Asp Lys	
945 950 955 960	
ggc agt tat gat cat gat gat gtg acc tac cta tat aag ctt gtg cgt	3027
Gly Ser Tyr Asp His Asp Asp Val Thr Tyr Leu Tyr Lys Leu Val Arg	
965 970 975	
ggc agt tat gat cat gat gat gtg acc tac cta tat aag ctt gtg cgt	3075
Gly Leu Cys Ser Arg Ser Phe Gly Phe Lys Val Ala Gln Leu Ala Gln	
980 985 990	
ata cct cca tca tgt ata cgt cga gcc att tca atg gct gca aaa ttg	3123
Ile Pro Pro Ser Cys Ile Arg Arg Ala Ile Ser Met Ala Ala Lys Leu	
995 1000 1005	
gaa gct gag gta cgt gca aga gag aga aat aca cgc atg gga gaa cca	3171
Glu Ala Glu Val Arg Ala Arg Glu Arg Asn Thr Arg Met Gly Glu Pro	
1010 1015 1020	
gaa gga cat gaa gaa ccg aga ggc gca gaa gaa tct att tcg gct cta	3219
Glu Gly His Glu Glu Pro Arg Gly Ala Glu Glu Ser Ile Ser Ala Leu	
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ggc agt tat gat cat gat gat gtg acc tac cta tat aag ctt gtg cgt	3267
Gly Asp Leu Phe Ala Asp Leu Lys Phe Ala Leu Ser Glu Glu Asp Pro	
1045 1050 1055	
tgg aaa gca ttc gag ttt tta aag cat gct tgg aag att gct ggc aaa	3315
Trp Lys Ala Phe Glu Phe Leu Lys His Ala Trp Lys Ile Ala Gly Lys	
1060 1065 1070	
atc aga cta aaa cca act tgt tca ttt tgatttaatc ttaacattat	3362

Ile Arg Leu Lys Pro Thr Cys Ser Phe
1075 1080

agcaactgca aggtcttgat catctgtag ttgcgtacta acttatgtgt attagtataa 3422
caagaaaaga gaattagaga gatggattct aatccggtgt tgcagtacat cttttctcca 3482
ccgcataaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 3522

<210> 19
<211> 1081
<212> PRT
<213> Arabidopsis thaliana ecotype Columbia
<223> Polypeptide MSH3

<400> 19

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1 5 10 15
Pro Lys Ser Pro Thr His Glu Pro Asn Pro Val Ala Glu Ser Ser Thr
20 25 30
Pro Pro Pro Lys Ile Ser Ala Thr Val Ser Phe Ser Pro Ser Lys Arg
35 40 45
Lys Leu Leu Ser Asp His Leu Ala Ala Ala Ser Pro Lys Lys Pro Lys
50 55 60
Leu Ser Pro His Thr Gln Asn Pro Val Pro Asp Pro Asn Leu His Gln
65 70 75 80
Arg Phe Leu Gln Arg Phe Leu Glu Pro Ser Pro Glu Glu Tyr Val Pro
85 90 95
Glu Thr Ser Ser Ser Arg Lys Tyr Thr Pro Leu Glu Gln Gln Val Val
100 105 110
Glu Leu Lys Ser Lys Tyr Pro Asp Val Val Leu Met Val Glu Val Gly
115 120 125
Tyr Arg Tyr Arg Phe Phe Gly Glu Asp Ala Glu Ile Ala Ala Arg Val
130 135 140
Leu Gly Ile Tyr Ala His Met Asp His Asn Phe Met Thr Ala Ser Val
145 150 155 160
Pro Thr Phe Arg Leu Asn Phe His Val Arg Arg Leu Val Asn Ala Gly
165 170 175
Tyr Lys Ile Gly Val Val Lys Gln Thr Glu Thr Ala Ala Ile Lys Ser
180 185 190
His Gly Ala Asn Arg Thr Gly Pro Phe Phe Arg Gly Leu Ser Ala Leu
195 200 205
Tyr Thr Lys Ala Thr Leu Glu Ala Ala Glu Asp Ile Ser Gly Gly Cys
210 215 220

Gly	Gly	Glu	Glu	Gly	Phe	Gly	Ser	Gln	Ser	Asn	Phe	Leu	Val	Cys	Val		
225					230					235					240		
Val	Asp	Glu	Arg	Val	Lys	Ser	Glu	Thr	Leu	Gly	Cys	Gly	Ile	Glu	Met		
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Ser	Phe	Asp	Val	Arg	Val	Gly	Val	Val	Gly	Val	Glu	Ile	Ser	Thr	Gly		
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Glu	Val	Val	Tyr	Glu	Glu	Phe	Asn	Asp	Asn	Phe	Met	Arg	Ser	Gly	Leu		
	275						280					285					
Glu	Ala	Val	Ile	Leu	Ser	Leu	Ser	Pro	Ala	Glu	Leu	Leu	Leu	Gly	Gln		
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Pro	Leu	Ser	Gln	Gln	Thr	Glu	Lys	Phe	Leu	Val	Ala	Met	Ala	Gly	Pro		
305					310					315					320		
Thr	Ser	Asn	Val	Arg	Val	Glu	Arg	Ala	Ser	Leu	Asp	Cys	Phe	Ser	Asn		
			325						330					335			
Gly	Asn	Ala	Val	Asp	Glu	Val	Ile	Ser	Leu	Cys	Glu	Lys	Ile	Ser	Ala		
			340					345					350				
Gly	Asn	Leu	Glu	Asp	Asp	Lys	Glu	Met	Lys	Leu	Glu	Ala	Ala	Glu	Lys		
	355						360					365					
Gly	Met	Ser	Cys	Leu	Thr	Val	His	Thr	Ile	Met	Asn	Met	Pro	His	Leu		
	370					375					380						
Thr	Val	Gln	Ala	Leu	Ala	Leu	Thr	Phe	Cys	His	Leu	Lys	Gln	Phe	Gly		
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Phe	Glu	Arg	Ile	Leu	Tyr	Gln	Gly	Ala	Ser	Phe	Arg	Ser	Leu	Ser	Ser		
			405						410					415			
Asn	Thr	Glu	Met	Thr	Leu	Ser	Ala	Asn	Thr	Leu	Gln	Gln	Leu	Glu	Val		
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Val	Lys	Asn	Asn	Ser	Asp	Gly	Ser	Glu	Ser	Gly	Ser	Leu	Phe	His	Asn		
	435						440					445					
Met	Asn	His	Thr	Leu	Thr	Val	Tyr	Gly	Ser	Arg	Leu	Leu	Arg	His	Trp		
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Val	Thr	His	Pro	Leu	Cys	Asp	Arg	Asn	Leu	Ile	Ser	Ala	Arg	Leu	Asp		
465					470					475					480		
Ala	Val	Ser	Glu	Ile	Ser	Ala	Cys	Met	Gly	Ser	His	Ser	Ser	Ser	Gln		
				485					490					495			
Leu	Ser	Ser	Glu	Leu	Val	Glu	Glu	Gly	Ser	Glu	Arg	Ala	Ile	Val	Ser		
			500					505					510				
Pro	Glu	Phe	Tyr	Leu	Val	Leu	Ser	Ser	Val	Leu	Thr	Ala	Met	Ser	Arg		
	515						520					525					

Ser	Ser	Asp	Ile	Gln	Arg	Gly	Ile	Thr	Arg	Ile	Phe	His	Arg	Thr	Ala	
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Lys	Ala	Thr	Glu	Phe	Ile	Ala	Val	Met	Glu	Ala	Ile	Leu	Leu	Ala	Gly	
545					550					555					560	
Lys	Gln	Ile	Gln	Arg	Leu	Gly	Ile	Lys	Gln	Asp	Ser	Glu	Met	Arg	Ser	
				565					570					575		
Met	Gln	Ser	Ala	Thr	Val	Arg	Ser	Thr	Leu	Leu	Arg	Lys	Leu	Ile	Ser	
			580					585					590			
Val	Ile	Ser	Ser	Pro	Val	Val	Val	Asp	Asn	Ala	Gly	Lys	Leu	Leu	Ser	
		595					600					605				
Ala	Leu	Asn	Lys	Glu	Ala	Ala	Val	Arg	Gly	Asp	Leu	Leu	Asp	Ile	Leu	
610						615					620					
Ile	Thr	Ser	Ser	Asp	Gln	Phe	Pro	Glu	Leu	Ala	Glu	Ala	Arg	Gln	Ala	
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Val	Leu	Val	Ile	Arg	Glu	Lys	Leu	Asp	Ser	Ser	Ile	Ala	Ser	Phe	Arg	
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Lys	Lys	Leu	Ala	Ile	Arg	Asn	Leu	Glu	Phe	Leu	Gln	Val	Ser	Gly	Ile	
			660					665					670			
Thr	His	Leu	Ile	Glu	Leu	Pro	Val	Asp	Ser	Lys	Val	Pro	His	Asn	Trp	
		675					680					685				
Val	Lys	Val	Asn	Ser	Thr	Lys	Lys	Thr	Ile	Arg	Tyr	His	Pro	Pro	Glu	
		690				695					700					
Ile	Val	Ala	Gly	Leu	Asp	Glu	Leu	Ala	Leu	Ala	Thr	Glu	His	Leu	Ala	
705					710					715					720	
Ile	Val	Asn	Arg	Ala	Ser	Trp	Asp	Ser	Phe	Leu	Lys	Ser	Phe	Ser	Arg	
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Tyr	Tyr	Thr	Asp	Phe	Lys	Ala	Ala	Val	Gln	Ala	Leu	Ala	Ala	Leu	Asp	
			740					745					750			
Cys	Leu	His	Ser	Leu	Ser	Thr	Leu	Ser	Arg	Asn	Lys	Asn	Tyr	Val	Arg	
		755					760					765				
Pro	Glu	Phe	Val	Asp	Asp	Cys	Glu	Pro	Val	Glu	Ile	Asn	Ile	Gln	Ser	
		770				775					780					
Gly	Arg	His	Pro	Val	Leu	Glu	Thr	Ile	Leu	Gln	Asp	Asn	Phe	Val	Pro	
785					790					795					800	
Asn	Asp	Thr	Ile	Leu	His	Ala	Glu	Gly	Glu	Tyr	Cys	Gln	Ile	Ile	Thr	
				805					810					815		
Gly	Pro	Asn	Met	Gly	Gly	Lys	Ser	Cys	Tyr	Ile	Arg	Gln	Val	Ala	Leu	
			820					825					830			

Ile Ser Ile Met Ala Gln Val Gly Ser Phe Val Pro Ala Ser Phe Ala
 835 840 845
 Lys Leu His Val Leu Asp Gly Val Phe Thr Arg Met Gly Ala Ser Asp
 850 855 860
 Ser Ile Gln His Gly Arg Ser Thr Phe Leu Glu Glu Leu Ser Glu Ala
 865 870 875 880
 Ser His Ile Ile Arg Thr Cys Ser Ser Arg Ser Leu Val Ile Leu Asp
 885 890 895
 Glu Leu Gly Arg Gly Thr Ser Thr His Asp Gly Val Ala Ile Ala Tyr
 900 905 910
 Ala Thr Leu Gln His Leu Leu Ala Glu Lys Arg Cys Leu Val Leu Phe
 915 920 925
 Val Thr His Tyr Pro Glu Ile Ala Glu Ile Ser Asn Gly Phe Pro Gly
 930 935 940
 Ser Val Gly Thr Tyr His Val Ser Tyr Leu Thr Leu Gln Lys Asp Lys
 945 950 955 960
 Gly Ser Tyr Asp His Asp Asp Val Thr Tyr Leu Tyr Lys Leu Val Arg
 965 970 975
 Gly Leu Cys Ser Arg Ser Phe Gly Phe Lys Val Ala Gln Leu Ala Gln
 980 985 990
 Ile Pro Pro Ser Cys Ile Arg Arg Ala Ile Ser Met Ala Ala Lys Leu
 995 1000 1005
 Glu Ala Glu Val Arg Ala Arg Glu Arg Asn Thr Arg Met Gly Glu Pro
 1010 1015 1020
 Glu Gly His Glu Glu Pro Arg Gly Ala Glu Glu Ser Ile Ser Ala Leu
 1025 1030 1035 1040
 Gly Asp Leu Phe Ala Asp Leu Lys Phe Ala Leu Ser Glu Glu Asp Pro
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<210> 20

<211> 24

<212> DNA

<213> Artificial sequence

<220>

<223> MSH6 specific primer 638 for PCR using cDNA of Arabidopsis thaliana

ecotype Columbia

<400> 20

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<210> 21

<211> 28

<212> DNA

<213> Artificial sequence

<220>

<223> Primer S81 for PCR using cDNA of Arabidopsis thaliana ecotype Columbia

<400> 21

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<210> 22

<211> 30

<212> DNA

<213> Artificial sequence

<220>

<223> MSH6 specific primer S823 for PCR using cDNA of Arabidopsis thaliana ecotype Columbia

<400> 22

gcttggcgca tctaatagaa tcatgacagg 30

<210> 23

<211> 24

<212> DNA

<213> Artificial sequence

<220>

<223> MSH6 specific primer 637 for PCR using cDNA of Arabidopsis thaliana ecotype Columbia

<400> 23

gacagcgtca gttcttcaga atgc 24

<210> 24

<211> 33

<212> DNA

<213> Artificial sequence

<220>

<223> MSH6 specific primer 1S8 for PCR using cDNA of Arabidopsis thaliana ecotype Columbia

<400> 24

atccccgggat gcagcgccag agatcgattt tgt 33

<210> 25

<211> 27

<212> DNA

<213> Artificial sequence

<220>

<223> MSH6 specific primer S83 for PCR using cDNA of Arabidopsis thaliana ecotype Columbia

<400> 25

cgctatctat ggctgcttcg aattgag 27

<210> 26

<211> 2188

<212> DNA

<213> Arabidopsis thaliana ecotype Columbia

<223> Clone 43

<400> 26

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gttgttccgc	tgaatgattc	atctctatgt	atgaaggcta	atgatgttat	tcctcaattt	420
cgttccaata	atggtaaaac	tcaagaaaga	aaccatgctt	ttagtttcag	tgggagagct	480
gaacttagat	cagtagaaga	tataggagta	gatggcgatg	ttcctgggtc	agaaacacca	540
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gaggataagg	ttcctgtatt	ggactctaac	aaaaggctga	aatgctcca	ggatccggtt	660
tgtggagaga	agaaagaagt	aaacgaagga	accaaatttg	aatggcttga	gtcttctcga	720
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agtgaatata	tggacattgt	gcttttcttt	aaagtgggga	aattttatga	gctgtatgag	900
ctagatgcgg	aattaggtca	caaggagctt	gactggaaga	tgaccatgag	tgggtgtggga	960
aaatgcagac	aggttggtat	ctctgaaagt	gggatagatg	aggcagtgca	aaagctatta	1020
gctcgtggat	ataaagttgg	acgaatcgag	cagctagaaa	catctgacca	agcaaaagcc	1080
agaggtgcta	atactataat	tccaaggaag	ctagttcagg	tattaactcc	atcaacagca	1140
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tgccatccac	tcaaagatgt	agaaagcatc	aataaacggc	ttgatgtagt	tgaagaattc	1860
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gaaagactgc	tcggaacgcat	caagtctagc	gttcgatcat	cagcctctgt	gttgccctgt	1980
cttctgggga	aaaaagtgt	gaaacaacga	gttaaagcat	ttgggcaa	tgtgaaagg	2040
ttcagaagt	gaattgatct	gttgttggt	ctacagaagg	aatcaaata	gatgagttt	2100
ctttataaac	tctgtaaact	tcctatatta	gtaggaaaa	gcgggctaga	gttatttctt	2160
tctcaattcg	aagcagccat	agatagcg				2188

<210> 27
 <211> 1385
 <212> DNA
 <213> Arabidopsis thaliana ecotype Columbia
 <223> Clone 62

<400> 27

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aggaatcaaa	tatgatgagt	ttgctttata	aactctgtaa	acttcctata	ttagtaggaa	180
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ttgacgaact	gggcagagga	actagtactt	tcgatggata	cgccattgca	tactcggttt	900
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tcaccaagga	attcgcgtct	caccacgtg	tcacctcgaa	acacatggct	tgccgattca	1020
aatcaagatc	tgattatcaa	ccacgtggtt	gtgatcaaga	cctagtgttc	ttgtaccgtt	1080
taaccgaggg	agcttgtcct	gagagctacg	gacttcaagt	ggcactcatg	gctggaatac	1140
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aaaacttcaa	gtcaagtgtg	ctaagatctg	agttctcaag	tctgcatgaa	gactggctca	1260
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ccggg					1385	

<210> 28
 <211> 34
 <212> DNA
 <213> Artificial sequence

<220>
 <223> MSH6 specific primer 2S8 for PCR using cDNA of Arabidopsis thaliana ecotype Columbia

<400> 28

atccccgggtt atttgggaac acagtaagag gatt 34

<210> 29
 <211> 27
 <212> DNA
 <213> Artificial sequence

<220>
 <223> MSH6 specific primer S82 for PCR using cDNA of Arabidopsis thaliana ecotype Columbia

<400> 29

gcgttcgatc atcagcctct gtgttgc 27

<210> 30
 <211> 3606
 <212> DNA
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<220>
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 <222> (142)...(3468)
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tctctctcac aattccaaaa a atg cag cgc cag aga tcg att ttg tct ttc 171
 Met Gln Arg Gln Arg Ser Ile Leu Ser Phe
 1 5 10

ttc caa aaa ccc acc gcg gcg act acg aag ggt ttg gtt tcc ggc gat 219
 Phe Gln Lys Pro Thr Ala Ala Thr Thr Lys Gly Leu Val Ser Gly Asp
 15 20 25

gct gct agc ggc ggg ggc ggc agc gga gga cca cga ttt aat gtg aag 267
 Ala Ala Ser Gly Gly Gly Ser Gly Gly Pro Arg Phe Asn Val Arg
 30 35 40

gaa ggg gat gct aaa ggc gac gct tct gta cgt ttt gct gtt tcg aaa 315
 Glu Gly Asp Ala Lys Gly Asp Ala Ser Val Arg Phe Ala Val Ser Lys
 45 50 55

tct gtc gat gag gtt aga gga acg gat act cca ccg gag aag gtt ccg 363
 Ser Val Asp Glu Val Arg Gly Thr Asp Thr Pro Pro Glu Lys Val Pro
 60 65 70

cgt cgt gtc ctg ccg tct gga ttt aag ccg gct gaa tcc gcc gst gat 411
 Arg Arg Val Leu Pro Ser Gly Phe Lys Pro Ala Glu Ser Ala Gly Asp
 75 80 85 90

gct tcg tcc ctg ttc tcc aat att atg cat aag ttt gta aaa gtc gat 459
 Ala Ser Ser Leu Phe Ser Asn Ile Met His Lys Phe Val Lys Val Asp
 95 100 105

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Asp	Arg	Asp	Cys	Ser	Gly	Glu	Arg	Ser	Arg	Glu	Asp	Val	Val	Pro	Leu	
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aat	gat	tca	tct	cta	tgt	atg	aag	gct	aat	gat	gtt	att	cct	caa	ttt	555
Asn	Asp	Ser	Ser	Leu	Cys	Met	Lys	Ala	Asn	Asp	Val	Ile	Pro	Gln	Phe	
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Arg	Ser	Asn	Asn	Gly	Lys	Thr	Gln	Glu	Arg	Asn	His	Ala	Phe	Ser	Phe	
	140					145					150					
agt	ggg	aga	gct	gaa	ctt	aga	tca	gta	gaa	gat	ata	gga	gta	gat	ggc	651
Ser	Gly	Arg	Ala	Glu	Leu	Arg	Ser	Val	Glu	Asp	Ile	Gly	Val	Asp	Gly	
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Asp	Val	Pro	Gly	Pro	Glu	Thr	Pro	Gly	Met	Arg	Pro	Arg	Ala	Ser	Arg	
				175					180					185		
ttg	aag	cga	gtt	ctg	gag	gat	gaa	atg	act	ttt	aag	gag	gat	aag	gtt	747
Leu	Lys	Arg	Val	Leu	Glu	Asp	Glu	Met	Thr	Phe	Lys	Glu	Asp	Lys	Val	
			190					195					200			
cct	gta	ttg	gac	tct	aac	aaa	agg	ctg	aaa	atg	ctc	cag	gat	ccg	gtt	795
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Gln	Arg	Val	Lys	Ala	Phe	Gly	Gln	Ile	Val	Lys	Gly	Phe	Arg	Ser	Gly	
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Asn Ile Met His Lys Phe Val Lys Val Asp Asp Arg Asp Cys Ser Gly

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Arg	Met	Leu	Phe	Ala	Thr	His	Tyr	His	Pro	Leu	Thr	Lys	Glu	Phe	Ala
				965					970					975	
Ser	His	Pro	Arg	Val	Thr	Ser	Lys	His	Met	Ala	Cys	Ala	Phe	Lys	Ser
			980					985					990		
Arg	Ser	Asp	Tyr	Gln	Pro	Arg	Gly	Cys	Asp	Gln	Asp	Leu	Val	Phe	Leu
		995					1000					1005			
Tyr	Arg	Leu	Thr	Glu	Gly	Ala	Cys	Pro	Glu	Ser	Tyr	Gly	Leu	Gln	Val

1010	1015	1020
Ala Leu Met Ala Gly Ile Pro Asn Gln Val Val Glu Thr Ala Ser Gly		
1025	1030	1035 1040
Ala Ala Gln Ala Met Lys Arg Ser Ile Gly Glu Asn Phe Lys Ser Ser		
	1045	1050 1055
Glu Leu Arg Ser Glu Phe Ser Ser Leu His Glu Asp Trp Leu Lys Ser		
	1060	1065 1070
Leu Val Gly Ile Ser Arg Val Ala His Asn Asn Ala Pro Ile Gly Glu		
	1075	1080 1085
Asp Asp Tyr Asp Thr Leu Phe Cys Leu Trp His Glu Ile Lys Ser Ser		
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Tyr Cys Val Pro Lys		
1105		

<210> 32
 <211> 24
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<220>
 <223> Forward primer for PCR amplification of ATHGENEA microsatellite

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<210> 33
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 <212> DNA
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<220>
 <223> Reverse primer for PCR amplification of ATHGENEA microsatellite

<400> 33

acataaccac aaataggggt gc 22

<210> 34
 <211> 18
 <212> DNA
 <213> Artificial sequence

<220>
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 ssp. Landsberg erecta "Ler"

<400> 34

gaagcgatat tggtcgtg 18

<210> 35
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<212> DNA
<213> Artificial sequence

<220>
<223> Reverse primer DMCIN-B for PCR on genomic DNA of *Arabidopsis thaliana* ssp. *Landsberg erecta* "Ler"

<400> 35

agattgcgag aacattcc 18

<210> 36
<211> 31
<212> DNA
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<220>
<223> Forward primer DMCIN-1 for PCR on genomic DNA of *Arabidopsis thaliana* ssp. *Landsberg erecta* "Ler"

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acgcgtcgac tcagctatga gattactcgt g 31

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gctctagatt tctcgctcta agactctct 29

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<220>
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<400> 38

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<210> 39

<211> 48

<212> DNA

<213> Artificial sequence

<220>

<223> Reverse primer DMCIN-4 for PCR on genomic DNA of *Arabidopsis thaliana* ssp. *Landsberg erecta* "Ler"

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<211> 26

<212> DNA

<213> Artificial sequence

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<223> Forward primer DMC1a for PCR on genomic DNA of *Arabidopsis thaliana* ssp. *Landsberg erecta* "Ler"

<400> 40

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<210> 41

<211> 38

<212> DNA

<213> Artificial sequence

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<223> Reverse primer DMC1b for PCR on genomic DNA of *Arabidopsis thaliana* ssp. *Landsberg erecta* "Ler"

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<211> 20

<212> DNA

<213> Artificial sequence

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<223> Forward primer for PCR amplification of ATEAT1 SSLP marker in *Arabidopsis thaliana* subspecies

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<210> 43
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<212> DNA
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<220>
<223> Reverse primer for PCR amplification of ATEAT1 SSLP marker in
Arabidopsis thaliana subspecies

<400> 43

cgaacagcca acattaattc cc 22

<210> 44
<211> 18
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Arabidopsis
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aaccaaggca cagaagcg 18

<210> 45
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Arabidopsis
thaliana subspecies

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acccaagtga tcgccacc 18

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Arabidopsis thaliana subspecies

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taccgaacca aaacacaaag g 21

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gcacataccc acaaccagaa 20

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aaagagatga gaatttggac 20

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<223> Forward primer for PCR amplification of AthUBIQUE SSLP marker in
Arabidopsis thaliana subspecies

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aggcaaattgt ccatttcatt g 21

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Arabidopsis thaliana subspecies

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agctgcttcc ttatagcgtc c 21

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 catccgaatg ccattgttc 19

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 caagagcaat atcaagagca gc 22

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ctctgtcact cttttcctct gg 22

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thaliana subspecies

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tggatttctt cctctcttca c 21

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thaliana subspecies

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atggagaagc ttacactgat c 21

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Arabidopsis
thaliana subspecies

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thaliana subspecies

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tgatgctctc tgaaacaaga gc 22

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thaliana subspecies

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gagggcaaat ctttatttcg g 21

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Arabidopsis
thaliana subspecies

<400> 77

tggttttcgt ttataaacat cc 22

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Arabidopsis thaliana subspecies

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gcgaaaaaac aaaaaaatcc a 21

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Arabidopsis thaliana subspecies

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cgacgaatcg acagaattag g 21

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Arabidopsis thaliana subspecies

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gaaatccaaa tcccagagag g 21

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Arabidopsis thaliana subspecies

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tctccccact agttttgtgt cc 22

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Arabidopsis thaliana subspecies

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taccgtcaat ttcatcgcc 19

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Arabidopsis thaliana subspecies

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ggatccctaa ctgtaaaatc cc 22

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Arabidopsis
thaliana subspecies

<400> 84

aatcccagta accaaacaca ca 22

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Arabidopsis
thaliana subspecies

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cccagtctaa ccacgaccac 20

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Arabidopsis thaliana subspecies

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Arabidopsis thaliana subspecies

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cagtctaaaa gcgagagtat gatg 24

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thaliana subspecies

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ggagaaaatg tcactctcca cc 22

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thaliana subspecies

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aggcatggga gacatttacg 20

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<223> Forward primer for PCR amplification of ATHSO191 SSLP marker in
Arabidopsis thaliana subspecies

<400> 94

ctccaccaat catgcaaag 20

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Arabidopsis thaliana subspecies

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 Thr Phe Asn Asp Ile Asp Phe Ala Lys Lys Leu Asp Arg Ile Met Lys
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 Glu Glu Asp Phe Val Lys Lys Lys Ala Arg Lys Ser Pro Thr Ala Lys
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 Asp Lys Val Leu Val Ile Arg Val Gly Tyr Lys Tyr Lys Cys Phe Ala
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 Glu Asp Ala Val Thr Val Ser Arg Ile Leu His Ile Lys Leu Val Pro
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 305 310 315 320
 Lys Tyr Ser Leu Ile Ser Val Asn Leu Asn Asn Gly Glu Val Val Tyr
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	740						745					750				
Leu	Val	Glu	Ala	Val	Lys	Ser	Trp	Thr	Asn	Ala	Phe	Glu	Arg	Gln	Lys	
	755					760					765					
Ala	Ile	Asn	Glu	Asn	Ile	Ile	Val	Pro	Gln	Arg	Gly	Phe	Asp	Ile	Glu	
	770				775						780					
Phe	Asp	Lys	Ser	Met	Asp	Arg	Ile	Gln	Glu	Leu	Glu	Asp	Glu	Leu	Met	
785					790					795					800	
Glu	Ile	Leu	Met	Thr	Tyr	Arg	Lys	Gln	Phe	Lys	Cys	Ser	Asn	Ile	Gln	
			805						810					815		
Tyr	Lys	Asp	Ser	Gly	Lys	Glu	Ile	Tyr	Thr	Ile	Glu	Ile	Pro	Ile	Ser	
		820						825					830			
Ala	Thr	Lys	Asn	Val	Pro	Ser	Asn	Trp	Val	Gln	Met	Ala	Ala	Asn	Lys	
	835						840					845				
Thr	Tyr	Lys	Arg	Tyr	Tyr	Ser	Asp	Glu	Val	Arg	Ala	Leu	Ala	Arg	Ser	
	850					855					860					
Met	Ala	Glu	Ala	Lys	Glu	Ile	His	Lys	Thr	Leu	Glu	Glu	Asp	Leu	Lys	
865					870					875					880	
Asn	Arg	Leu	Cys	Gln	Lys	Phe	Asp	Ala	His	Tyr	Asn	Thr	Ile	Trp	Met	
			885					890						895		
Pro	Thr	Ile	Gln	Ala	Ile	Ser	Asn	Ile	Asp	Cys	Leu	Leu	Ala	Ile	Thr	
		900						905					910			
Arg	Thr	Ser	Glu	Tyr	Leu	Gly	Ala	Pro	Ser	Cys	Arg	Pro	Thr	Ile	Val	
	915						920					925				
Asp	Glu	Val	Asp	Ser	Lys	Thr	Asn	Thr	Gln	Leu	Asn	Gly	Phe	Leu	Lys	
	930					935					940					
Phe	Lys	Ser	Leu	Arg	His	Pro	Cys	Phe	Asn	Leu	Gly	Ala	Thr	Thr	Ala	
945					950					955					960	
Lys	Asp	Phe	Ile	Pro	Asn	Asp	Ile	Glu	Leu	Gly	Lys	Glu	Gln	Pro	Arg	
			965					970						975		
Leu	Gly	Leu	Leu	Thr	Gly	Ala	Asn	Ala	Ala	Gly	Lys	Ser	Thr	Ile	Leu	
		980					985						990			
Arg	Met	Ala	Cys	Ile	Ala	Val	Ile	Met	Ala	Gln	Met	Gly	Cys	Tyr	Val	
	995					1000						1005				
Pro	Cys	Glu	Ser	Ala	Val	Leu	Thr	Pro	Ile	Asp	Arg	Ile	Met	Thr	Arg	
	1010					1015					1020					
Leu	Gly	Ala	Asn	Asp	Asn	Ile	Met	Gln	Gly	Lys	Ser	Thr	Phe	Phe	Val	
1025					1030					1035					1040	

